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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/608,300	06/27/2003	Srinivas Doddi	509982005500	9021

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EXAMINER
ZHU, JERRY

ART UNIT	PAPER NUMBER
2129	

DATE MAILED: 03/30/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

PTO-90C (Rev. 10/03)

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE _3_ MONTH(S) FROM
THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed
  after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
  Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any
  earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL.**   2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is
closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) _1-29_ is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) _1-29_ is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a)☐ All   b)☐ Some * c)☐ None of:

      1.☐ Certified copies of the priority documents have been received.

      2.☐ Certified copies of the priority documents have been received in Application No. _____.

      3.☐ Copies of the certified copies of the priority documents have been received in this National Stage
application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1)☒ Notice of References Cited (PTO-892)

2)☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3)☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
    Paper No(s)/Mail Date _____.

4)☐ Interview Summary (PTO-413)
    Paper No(s)/Mail Date. _____ .

5)☐ Notice of Informal Patent Application (PTO-152)

6)☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that

form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claim 1-29 rejected under 35 U.S.C. 102(e) as being anticipated by Singh et, al,

U.S. Patent number 6,650,422 (Singh). Specifically,

Claim 1

1. (claim 1) Singh teaches a method of examining a structure formed on a

semiconductor wafer (col. 2, lin. 14-17), the method comprising:

- Obtaining a first diffraction signal measured using a metrology device (col.2,

    lin.25-28)

- Obtaining a second diffraction signal using a machine learning systems (col. 3,

    lin.1-3; col.9, lin.7-12; a second signal is data signature associated with known

    feature profile stored in database used to train a neural network. The second

    signal is obtained from a neural network that is a machine learning system.)

- Comparing the first and second diffraction signals (col.2, lin.67; col.3, lin.1-3)

- When a match for the comparison, a feature of the structure based on the profile in the machine learning system is determined. (col.3, lin.3-5; col.9, lin.7-15; the trained neural network is the machine learning system.)

Claims 2-15

2. Singh's method as disclosed in claim 1 above teaches that a trained neural network can be used to provide a known feature profile to compare with the first diffraction signal (col.9, lin.1-15). Singh does not teach the detail of designing and training of such a neural network. However, the design of a neural network such as choosing input and output training data, algorithms selected to train, the partition of the neural network is a design choice. The variation of such a design choice differs from designer to designer. It is analogous to software design that a given function can be implemented in different computer languages and techniques. Therefore the steps and techniques used in the neural network design taught in claims 2-15 has little patentable content. It should be noted that claims 2-15 are design choice and the change of it does not change the patentability of the invention.

3. (claims 2-3) It is inherent that prior to using the machine learning system (that is a neural network) it must to be trained. It is also inherent that training input and output data must be selected before training can be conducted. Singh teaches that the database of signatures associated with known feature profiles maybe utilized to input training data. (col.9, lin.8-10) The admitted prior art teaches that diffracted

beam determines a feature of the structure. Therefore it is inherent to choose a
diffraction signal correlated to the profile as output training data in the context set
forth by the admitted prior art.

4. (claim 4) Singh teaches dividing the range of profiles into two partitions. (col.2,
lin.25-36). Hence it is inherent to choose two machine-learning systems to learn
both partitions under the context set forth by Singh using selected input training data
described in claim 3.

5. (claims 5-6) The admitted prior art states that the diffraction beam (the output
training data) can be analyzed using modeling techniques such as wave analysis.

6. (claim 7) Using principal component to transform machine-learning system output
data is a taught in text and commonly used. It is a design choice whether to use
principal component, factor analysis or other techniques.

7. (claim 8) Singh teaches dividing the range of profiles into two partitions. (col.2,
lin.25-36). Hence it is inherent to choose two machine-learning systems to learn
both partitions under the context set forth by Singh using output training data
described in claim 2.

8. (claims 9-10) It is inherent that any neural network training comprises steps to get
input training data, compare output data with desired values, and act accordingly
with the comparison. It is also inherent that neural network training uses algorithms
such as back-propagation.

9. (claim 11-12) Singh uses first diffraction signal to compare with profiles in database
(col.3, lin.10-16). Singh also states that the database can be use to train a neural

network (col.9, lin.7-15) that will replace database to generate diffraction signals to compare.

10. (claims 13-14) Official notice is taken that metrology device is used to measure structure such as ellipsometer using dimension measurement such as n and k values. (See U.S. Patent 5,793,480. col. 2, lin.35-42)

11. (claim 15) It is inherent that machine-learning system is a neural network.

Claim 16-21 and 22-29

12. Claims 16-21 are computer program claims that implement method claims 1-15 using instruction code and claims 22-29 are systems claims that implement method claims 1-15 using various devices and computers. Therefore claims 16-21 and claims 22-29 are rejected under the same rationale as cited in the rejection of rejected claims 1-15.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Predictive network with learned preprocessing parameters; U.S. Patent Number 5,479,573.

Method and system for measuring patterned structures; U.S. Patent Number 6,657,736.

Any inquiry concerning this communication or earlier communications from the

examiner should be directed to Jerry Zhu whose telephone number is (571) 2724237.

The examiner can normally be reached on 8:30 - 5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's

supervisor, Anthony Knight can be reached on (571) 272-3687. The fax phone number

for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the

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Jerry Zhu
Examiner
Art Unit - 2121
3/22/2005

Anthony Knight
Supervisory Patent Examiner
Tech Center 2100